6

PROGRAM, LOGISTICS, AND RISK MANAGEMENT

Never too early to start logistics!
Cardinal rule

6.1 <u>POLICY</u>

6.1.1 Program Tailoring

All programs, including highly sensitive classified, cryptologic, and intelligence programs, shall accomplish certain core activities (described in DoDD 5000.1). These activities are tailored to minimize the time it takes to satisfy an identified need consistent with common sense and sound business practice. Some activities apply to Acquisition Category (ACAT I) programs only, not to ACAT II and III programs. Other important key activities for each phase will be applied on a program-by-program basis through the (Integrated Product Team) IPT process.

Tailoring gives full consideration to applicable statutes. Figure 6-1 depicts the major functions in the life-cycle acquisition process. The number of phases and decision points

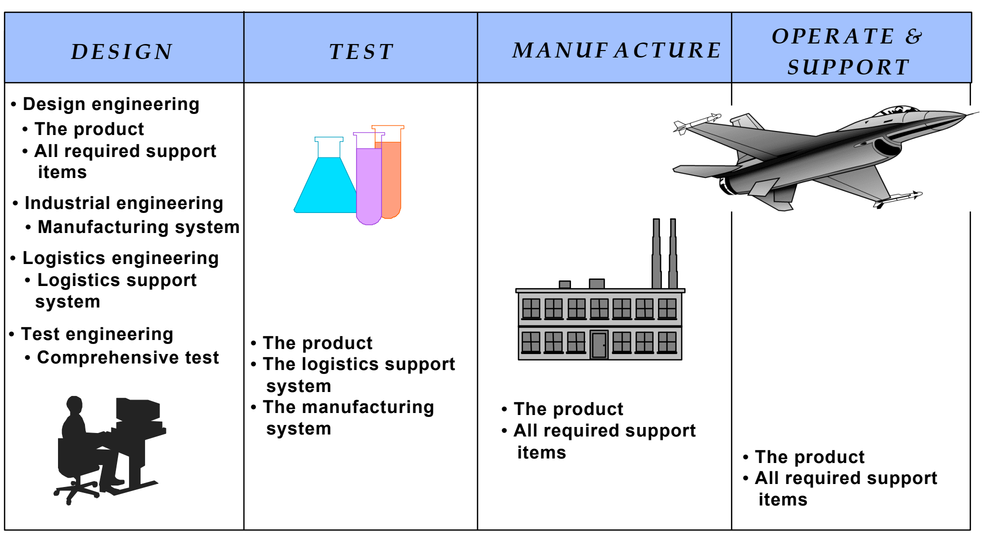

Figure 6-1: The Generic Life-Cycle Process

can be tailored to meet the specific needs of individual Program Managers (PMs) and their Milestone Decision Authority (MDA), based on objective assessments of a program's category status, risks, the adequacy of proposed risk management plans, and the urgency of the user's need. Tailored acquisition strategies may vary the way in which core activities are to be conducted, the formality of reviews and documentation, and the need for other supporting activities.

6.1.2 Determining Mission Needs and Identifying Deficiencies

Refer to Section 5.1.1 in the previous chapter.

6.1.3 Phase 0: Concept Exploration

Phase 0 typically consists of competitive, parallel, short-term concept studies. The focus of these efforts is to define and evaluate the feasibility of alternative concepts and to provide a basis for assessing the relative merits (i. e. advantages and disadvantages, degree of risk) of these concepts at the next milestone decision point. Analysis of alternatives shall be used as appropriate to facilitate comparisons of alternative concepts. The most promising system concepts shall be defined in terms of initial, broad objectives for cost, schedule, performance, software requirements, opportunities for tradeoffs, overall acquisition strategy, and test and evaluation strategy.

6.1.4 Phase I: Program Definition and Risk Reduction

During this phase, the program shall become defined as one or more concepts, design approaches, and/or parallel technologies that are pursued as warranted. Assessments of the advantages and disadvantages of alternative concepts shall be refined. Prototyping, demonstrations, and early operational assessments shall be considered and included as necessary to reduce risk so that technology, manufacturing, and support risks are well in hand before the next decision point. Cost drivers, life-cycle cost estimates, cost-performance trades, interoperability, and acquisition strategy alternatives are considered including evolutionary and incremental software development.

6.1.5 Phase II: Engineering and Manufacturing Development

The primary objectives of this phase are to translate the most promising design approach into a stable, interoperable, producible, supportable, and cost-effective design; validate the manufacturing or production process; and demonstrate system capabilities through testing. Low Rate Initial Production (LRIP) occurs while the Engineering and Manufacturing Development (EMD) phase is still continuing as test results and design fixes or upgrades are incorporated.

6.1.6 Low Rate Initial Production[1]

The objective of this activity is to produce the minimum quantity necessary to provide:

- production-configured, or representative, articles for operational tests;
- an initial production base for the system; and
- an orderly increase in the system production rate that is sufficient to lead to full-rate production upon successful completion of operational testing.

LRIP quantities for all ACATs shall be minimized. The MDA shall determine the LRIP quantity (10 USC (24004)) for all Acquisition Category (ACAT) I and II programs as part of the Engineering and Manufacturing Development (EMD) approval. The LRIP quantity (with rationale for quantities exceeding 10 percent of the total production quantity documented in the acquisition strategy) is included in the first Selected Acquisition Report (SAR) after its determination. The LRIP quantity shall not be less than one unit, and any increase shall be approved by the MDA. When approved LRIP quantities are expected to be exceeded because the program has not yet demonstrated readiness to proceed to full-rate production, the MDA assesses the cost and benefits of a break in production versus annual buys.

Note: The Director, Operational Test and Evaluation (DOT&E), is the decision authority for the number of LRIP articles required for Initial Operational Test and Evaluation (IOT&E) and for Live Fire Test and Evaluation (LFT&E).

6.1.7 Phase III: Production, Fielding/Deployment, and Operational Support

The objective of the Production, Fielding/Deployment, and Operational Support phase is to achieve an operational capability that satisfies mission needs. Deficiencies encountered in Developmental Test and Evaluation (DT&E) and IOT&E are resolved and fixes verified. The production requirement of this phase does not apply to ACAT IA acquisition programs or software-intensive systems with no developmental hardware components. During fielding/deployment and throughout operational support, the potential for modifications to the fielded/deployed system continues.

6.1.7.1 Production. Chapter 24 of this guide is devoted to the subject of production and the logistics planning and testing associated with that phase.

6.1.7.2 Deployment/Fielding. The term "deployment," as used here, includes fielding, turnover, hand-off, fleet introduction, and other terms used by the Services for the initial introduction of a system to operational commands. Included are deployment planning, execution, and follow-up requirements covering each of the logistics elements during the

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[1] LRIP is not applicable to ACAT IA programs; however, a limited deployment phase may be applicable.

acquisition periods from Concept Exploration (CE) until the last unit is operational. Chapter 7 of this Guide is devoted to a description of the logistics element, and Chapter 25 is devoted to the subject of deployment/fielding.

6.1.8 Operational Support

The objectives of this activity are the execution of a support program that meets the threshold values of all support performance requirements and sustainment of them in the most cost-effective manner over the life cycle. A follow-on operational testing program that assesses performance, quality, compatibility, and interoperability and that identifies deficiencies shall be conducted as appropriate. This activity shall also include the execution of operational support plans, including the transition from contractor to organic support, if appropriate.

6.1.9 Modifications

Any modification that is of sufficient cost and complexity and that could itself qualify as an ACAT I or ACAT IA program is considered for management purposes as a separate acquisition effort. Modifications that do not cross the ACAT I or IA threshold are considered part of the program being modified. Modifications may cause a program baseline deviation. Deviations shall be reported using the procedures in Part 6 of DoD 5000.2-R.

6.1.10 Demilitarization and Disposal

At the end of its useful life, a system must be demilitarized, disposed, or recycled. During demilitarization and disposal, the PM ensures that materiel determined to require demilitarization is controlled and that disposal is carried out in a way that minimizes DoD's liability due to environmental, safety, security, and health issues.

6.2 PRODUCT DEFINITION

Product definition is the common thread linking all acquisition disciplines. In the current environment of near-full dependence on performance and commercial specifications, program management faces a significant challenge in making sure that the product is clearly defined, because of the following factors:

- Program planning must know *what* to plan for.
- System engineering and software must know *what* to design.
- The test community must know *what* to test.
- The producer must know *what* to manufacture.
- The logistics community must know *what* to support.

- Contract management must know *what* to buy.

- Cost management must know *what* to estimate and control.

- Funds management must know *what* to budget.

6.3 TIME-PHASED SUPPORT ACTIVITIES

Figure 6-2 displays the defense systems acquisition management process, showing the key management activities associated with each phase of the acquisition process. Correspondingly, the paragraphs immediately below (6.3.1 through 6.3.4) outline the major activities of the Logistics Manager (LM) up to and including the EMD program phase. Subsequent chapters of this guide provide information regarding activities associated with Production (Chapter 24), Fielding/Deployment (Chapter 25), Postproduction Support (Chapter 27), and Disposal/Recycling/Demilitarization (Chapter 29). Figure 6-3 displays the logistics management activities that take place within the larger defense systems acquisition management process displayed in Figure 6-2.

6.3.1 Prior To Milestone 0

Prior to Milestone 0, the major preprogram effort is the preparation of a Mission Needs Statement (MNS). The MNS should identify all logistics support constraints. In order to derive the constraints, the LM should investigate lessons learned and improvement targets on existing like and similar systems and equipment. Also, the LM should identify potential logistics technologies, perform early support analysis activities at the system level, and assess alternative acquisition logistics strategies. In summary, the functions to be performed prior to Milestone 0 are to:

- include logistics support constraints in the MNS;

- investigate lessons learned and improvement targets;

- identify potential logistics technologies;

- assess alternative acquisition logistics strategies; and

- perform early support analysis activities, such as developing a support concept.

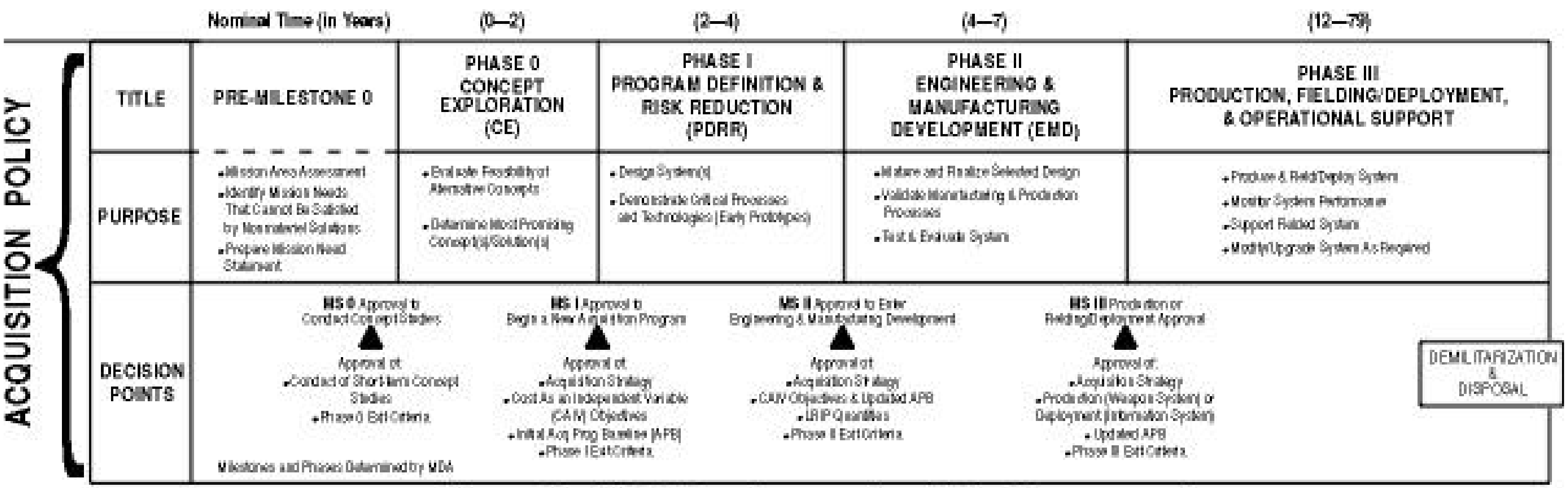

Figure 6-2: The Defense Systems Acquisition Management Process

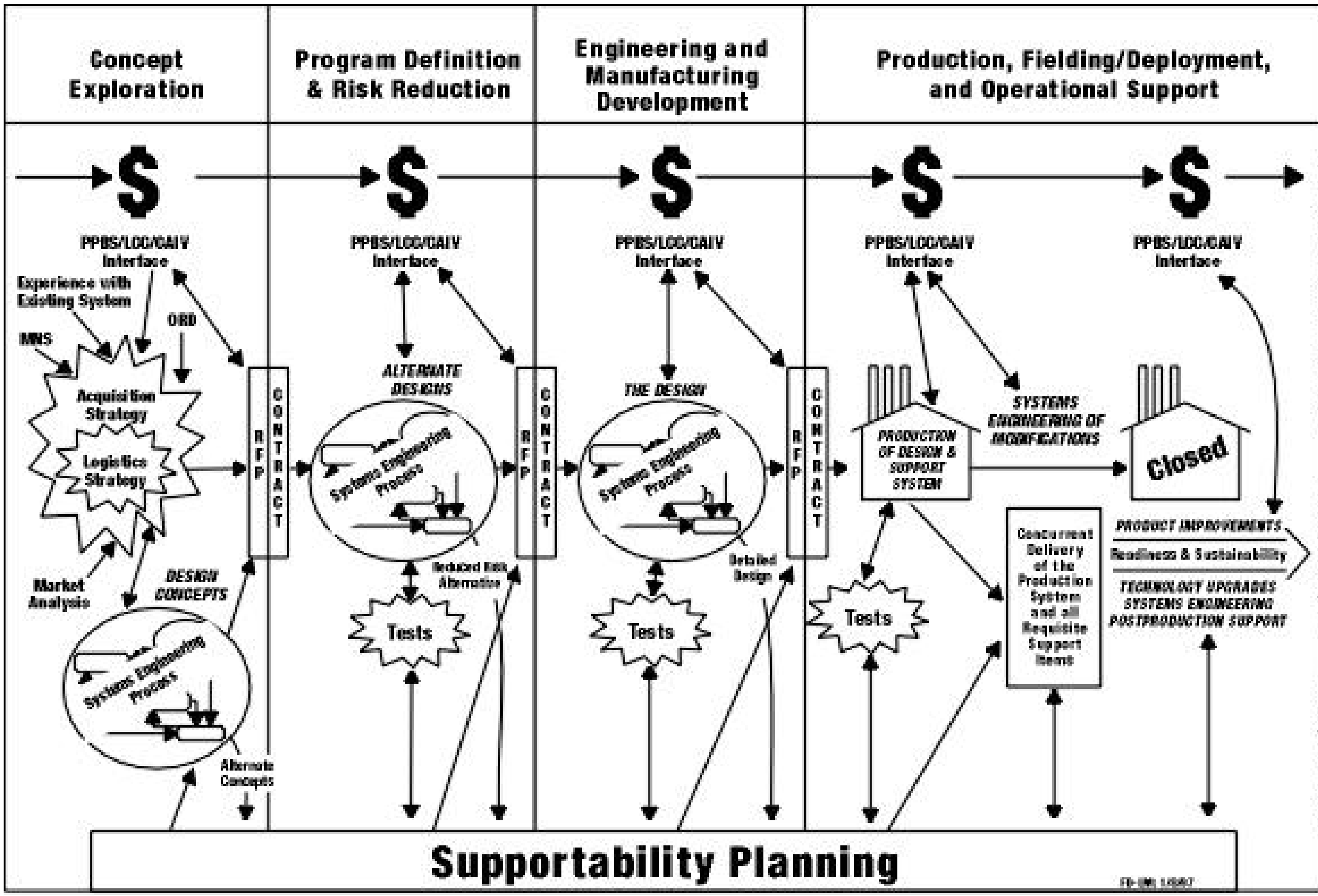

Figure 6-3: Acquisition Logistics Management Activities

6.3.2 Phase 0 – Concept Exploration

At this stage, no program or program office exists per se; but alternative concepts are being analyzed to satisfy the requirements of the MNS. A major planning effort is underway by a program office cadre to prepare for program initiation at Milestone I. The LM should:

- develop the acquisition logistics strategy;
- refine initial supportability planning and Life Cycle Cost (LCC) estimates;
- keep in step with emerging design;
- provide logistics involvement in PDRR contract management and Integrated Product Team (IPT) reviews;
- prepare logistics section of EMD contract package; and
- consider support analyses, such as Standardization and Interoperability.

6.3.3 Phase I – Program Definition and Risk Reduction

In this phase, principal program office activity centers on evaluating system alternatives; selecting preferred system alternative(s); defining the critical design characteristics and capabilities; and demonstrating that the required technologies can be incorporated into the system design. The LM will focus on the following tasks during this phase:

- implementing acquisition logistics strategy;
- refining initial supportability planning and LCC estimates;
- keeping in step with emerging design;
- providing logistics involvement in PDRR contract management and IPT reviews;
- preparing logistics section of EMD contract package;
- considering support analyses, such as standardization and interoperability; and
- initiating postproduction planning.

6.3.4 Phase II – Engineering and Manufacturing Development

The major activity of the PM is associated with translating the design approach into a stable, producible, and cost-effective system design and, through developmental and operational testing, demonstrating that the system meets specification requirements, satisfies the mission need, and meets minimally acceptable peacetime and wartime requirements. The main thrust of test programs is to evaluate system-level performance. However, the LM must build into the test program structure additional assessments of component evaluation and the adequacy of the logistics elements that comprise the logistics support structure. Further, the LM should work closely with the Program Management Office (PMO) and appropriate IPTs to accomplish the following:

- implement acquisition logistics strategy;
- continue to refine supportability planning and LCC estimates;
- commence Test and Evaluation (T&E) of logistics;
- continue logistics involvement in EMD contract management and IPT reviews;
- prepare the logistics sections of the Next-phase contract package; and
- consider support analyses, such as finalizing postproduction support plans.

6.4 RISK MANAGEMENT

Risk is inherent in any acquisition program and in virtually all functional areas of a program, *including the area of logistics*. The LM and other functional experts at all levels must address the areas of risk to ensure that program objectives are met. Risk management is a program management responsibility and is the act or practice of controlling risk drivers that adversely affect the program. It includes the process of identifying, analyzing, and tracking risk drivers; assessing the likelihood of their occurrence and their consequences; defining risk-handling plans; implementing these plans; and performing continuous assessments to determine how risks change during the life of the program. Risk management requires all process participants to use a disciplined approach so that an acceptable level of program risk is achieved and maintained. This is done by controlling the risks associated with the design, manufacturing, technology, test, and support functions that are part of systems acquisition.

A good risk management program can enhance program management effectiveness and provide managers with an important tool for reducing a system's life-cycle costs. A description of the risk management plan is an essential part of the program strategy. Effective risk management depends on a thorough understanding of the concept of risk, the principles of risk management, and the establishment of a disciplined risk management process. DoD policy does not mandate a specific approach to risk management. In the past, aggressive performance requirements would drive technical, cost, and schedule risks. Under the Cost As an Independent Variable (CAIV) concept, the emphasis is reversed; and aggressive cost objectives can drive performance and schedule requirements and risks. Moreover, in coordination with the user, requirements may be reduced or eliminated so risk is reduced to a level that increases the likelihood of meeting cost objectives. By establishing an effective risk management program, PMs may design and control their programs by using information about risk areas to set objectives, develop acquisition strategies to mitigate risk, and identify metrics that allow continual tracking and assessment of the program. This process includes risk planning, assessing risk areas, developing risk-handling options, monitoring risks to determine how risks have changed, and documenting the overall risk management program.

6.4.1 Managing Support Risks

The Logistics Manager (LM) must focus on the support risk as well as risks associated with cost and schedule. Key support risks are those associated with:

- achieving reliability, availability, and maintainability goals;
- achieving an effective logistics support structure; and
- successfully deploying/fielding the system.

Cost and schedule risks are largely associated with the accuracy of the cost and schedule estimating processes and their supporting assumptions as well as risk associated with bottlenecking events or a high degree of concurrency. Both tend to create multiple critical paths in the work effort.

To effectively manage the pertinent risks, the LM must understand:

- what adverse events may occur;
- the likelihood (probability) of each event occurring; and
- the severity of the cost, schedule, and performance impacts of each event.

Given this level of understanding, the manager is in a position to seek ways to do one or more of the following:

- make it less likely that the risk event will occur;
- deal with the cost, schedule, and performance effects of the risk event in ways that minimize damage to the program; and/or
- decide to accept the risk as reasonable given the cost, schedule, and performance advantages of the acquisition strategy and the program's requirements.

6.4.2 Risk Management in CAIV

The following list provides key areas of risk that must be addressed in a "formal risk" effort within a program as a part of the CAIV process. Such a risk effort must have dedicated program office assigned resources in order to implement CAIV. Some of these risks are in conflict with others and a continual balancing of these risks is required. Bad news should be allowed to surface; the manager should always know the worst thing that can happen to the program. The process, as noted earlier, is an iterative one; and the risks come into play multiple times during the life of the program. Risks to watch:

- The program is broken into manageable elements. The attention to costs required by CAIV makes it essential that the government PM has manageable elements for the entire program. These elements must have metrics so the accompanying risks can be measured, assessed, and managed for each element and the entire program.

- To provide realistic system affordability, the current budget and priority decisions for a system are sufficiently accurate and remain stable over the program life cycle. The program budget must be realistic and stable for a successful program. This is a major problem in managing most acquisition programs. It is even more critical under CAIV, where cost explicitly drives performance and schedule. *Keep cost off the critical path through daily management by key individuals.*

- The threshold performance requirements will provide the necessary mission effectiveness and will be stable during system development and production. Risks are the differences between threshold and objective requirements that provide sufficient tradeoffs between cost, schedule, and performance. The balance between ensuring that the system will meet the users true requirements and the necessity that the threshold requirement will be sufficiently low that real trade space exists between the threshold and objective is critical to the tradeoff process.

- The shape of the function relating performance, schedule, requirement(s), mission effectiveness, and cost can be determined and subsequently utilized in tradeoff analyses. The determination of this function and the desire to find the "knee of the curve" will require not only good cost data but also extensive modeling of mission effectiveness. An excellent example is the work of the F-22 Aircraft Program in modeling these relationships.

- The historical database for parametric estimates used in cost-effectiveness assessment is sufficiently applicable to the system being estimated to provide an accurate, most likely value and range (or probability distribution function) for the costs of the system. The database for parametric estimates seems to be always populated with programs that are sufficiently different in technology, design, or mission from the program that the validity of the estimate is in question. Further, there is almost no data linked to acquisition reform that reflects the cost savings within both government and industry. For good tradeoffs to be possible, good cost models, with valid data reflecting the current cost initiatives, must be available. The Under Secretary of Defense for Acquisition and Technology (USD(A&T)) has pointed out that much work remains to be done in the area of cost modeling in support of CAIV.

- The interrelationships of the system performance requirements are sufficiently understood to select the most cost-effective system performance objectives. Performance requirements and schedule must be accurately translated into contractual goals the contractor has sufficient incentive to achieve. System performance goals are seldom independent. The schedule can be linked to cost and mission. Understanding these interrelationships is critical to contracting with, and giving incentive to, the contractor.

- Technology developments will enable specific design and process decisions to be achieved. If the performance requirements have been too ambitious and they do not become achievable, the cost and schedule of technology development will become the drivers.

The central feature of CAIV is the tradeoff process. This process of determining affordable performance and scheduling based on cost goals is accomplished by a set of decisions that balance the above risks.

6.4.3 Risk Management in Joint Programs

In many ways, program management is risk management; and joint programs add to the number of risks facing the joint PM. By definition, the joint PM has multiple users, requirements and funding sources. These customers can adversely affect the health of the program by raising issues related to system requirements, funding variations, or political nuances within the program. A common issue is the degree and effectiveness of interoperability of the new system with participating Component systems. Accordingly, the joint PM should be careful to monitor technical risks in order to help maintain program consensus and ensure proper interoperability.

6.4.3.1 Logistics Risk Areas in Joint Programs. Logistics planning for joint programs requires more coordination than that required for single-Service programs. No other aspect of joint program management will confront the manager with as many inter-Service differences as logistics. Differences can occur in all of the logistics elements. The lack of extensive coordination can lead to:

- incomplete or inadequate logistics support at the time of initial deployment;

- a decision by one or more Services to go it alone with logistics planning and development of Service-unique logistics support; and

- loss of the economies that can be gained by joint-logistics performance.

6.4.3.2 Risk Handling. Success in joint program management comes from facilitating and expediting the required coordination, not from eliminating coordination and fragmenting the program. Methods that have been employed include:

- Early Recognition of Joint Requirements. During mission area analysis, a vital first step is early recognition that a joint program is needed. OSD, the Joint Chiefs of Staff (JCS), or two or more Services in unison may initiate the joint MNS. When this occurs, a joint program structure is recommended in the MNS; funding requirements for each Service are identified in each Service's initial Program Objectives Memorandum; and common and unique requirements of the Services are documented in the initial joint Logistics Plan prepared during CE.

- Staffing of the Joint Program Office. Senior representatives and other participating Service personnel serve two vital functions. First, they work as part of a team committed to objectives of the joint program. Second, they are conduits for rapid two-way communications and decisions on methods to implement joint planning and satisfy unique needs of each Service.

- Effective Communication. Implementation of joint logistics planning by the Services requires participation by their subordinate activities. Effective communications must be carried out among the provisioners, maintenance engineers, publication managers, trainers, and other logisticians who support the program within the Services. The lead LM must ensure that key logistics personnel from each Service are identified and that they jointly participate in planning and establishing the program. A hierarchy consisting of a high-level review team, a joint logistics committee, and functional working groups may be established to provide oversight and rapid decisions that meet each Service's needs.

- Incremental Development Techniques. Preplanned Product Improvement provisions, evolutionary development, and other incremental development techniques, especially if coordinated with user commands, can split development problems into small increments and defer large risks. The use of standard software and software reuse can also minimize software and program development risks. The Logistics IPT must closely monitor the program cost/design/performance tradeoffs to evaluate the logistics impacts on each of the Component support programs.

6.4.4 Reference

For more information regarding risk management tools and techniques, the reader is referred to the Teaching Note entitled, "Program Risk Management," by W. W. Bahnmaier and Paul McMahon, Defense Systems Management College, Oct. 8, 1996.